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NOTES ON THE PALM FLORA OF CENTRAL SUMATRA

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In July and August 1972, I spent five weeks on an expedition to study rattans and other palms in the provinces of Jambi and West Sumatra. This central area of Sumatra was chosen because expeditions have already been made to South Sumatra in February 1971 and March 1972 and to North Sumatra and Aceh with the Kyoto University Expedition in August 1971, and therefore collections made in this central area would link up collections from the south and north and would hence add considerably to our knowledge of the palm flora of this rich island. After advice from the Department of Nature Conservation in Jambi and from Dr. M. Jacobs in Rijksherbarium (Leiden) had been considered, it was decided to work westwards from Berbak Nature Reserve on the east coast near Nipah Panjang, to the Bukit Barisan, the main range of Sumatra, to Gunung Kerinci Nature Reserve and G. Tujuh near Sungai Penuh and from there, across the western part of the Bukit Barisan to Padang and Bukittinggi. From Bukittinggi it was planned to visit the *Rafflesia arnoldii* Nature Reserve at Batang Palupuh, and then return to Jambi by way of Muara Tebo and Muara Tembesi, where reputedly there still exists lowland forest. By more or less confining our collecting activities to the normally neglected Palmae it was hoped that within the time available a large area could be covered reasonably, and a palm transect for central Sumatra made. Two assistants from Bogor accompanied me to help in the difficult task of collecting rattans: Dedy Darnaedi (Herbarium Bogoriense) and Abdul Hanan (Kebun Raya). These assistants were also given individual collecting assignments as part of a scheme for training assistants in field botany. Dedy was to collect Pteridophyta and Hanan to collect material for growing in the Kebun Raya. Soetrisno Soewoko, head of Nature Conservation in Jambi accompanied us throughout the expedition.

From Jambi the Berbak Nature Reserve was reached by river-boat to Nipah Panjang and by perahu to Sungai Air Hitam via Tanjung Jabung and the open sea, this latter part of the journey being accomplished after dark and in the presence of frighteningly large waves. Camp was made within the peat swamp forest on the banks of the Sungai Air Hitam, about 15 km inland, and the area was worked thoroughly for palms.

After the first part of the expedition to Berbak we returned to Jambi and then left for Kerinci in a chartered short-wheel-base landrover, driving via Sarolangan and Bangko, making our first camp by the roadside in the middle of the beautiful Pegunungan Merangin near Kampung Penetai. After collecting here we drove on to Sungai Penuh and hence to Kayu Aro, where we used Kampung Pelompek as a base from which to work Gunung Tujuh, the lower slopes of Gunung Kerinci, and the Bento marshes. From Kayu Aro we went back to Sg. Penuh and made one camp 27 km from Sungai Penuh on the road over the Bukit Barisan to Tapan and collected in this area and further down the road to Tapan. Hence the expedition left for Padang and Bukit Tinggi to visit the *Rafflesia arnoldii* Nature Reserve at Batang Palupuh.

From Bukit Tinggi it took 3 days to reach Jambi again; included in the journey was one collecting stop between Muara Tebo and Muara Tembesi in a fragment of lowland Dipterocarp forest.

Specimens were collected with as many duplicates as possible, but owing to the difficulties of making good palm specimens it was in fact rarely possible to collect more than 4 sets. Material was preserved in alcohol using the modified Schweinfurth technique using polythene bags and newspaper. When polythene bags were filled they were sown in threes inside woven polythene fertilizer sacks and were then tied on to the Landrover or else sent back to Jambi with other vehicles. The specimens collected in this way arrived back in Bogor in excellent condition. The plastic bag technique is hence quite successful for palm material so long as thorny material is always well wrapped in newspaper and inserted between non-spiny material.

In the account which follows, the palm floras of the different localities visited are described. Numbers in brackets refer to the author's collecting numbers.

PEAT SWAMP AT BERBAK

Except for the coastal mangrove fringe, the Berbak Nature Reserve at Sg. Air Hitam consists almost entirely of peat swamp forest. The coastal fringe contains *Nypa fruticans* and *Oncosperma tigillarium* in extraordinary abundance; when viewed from the river the *Oncosperma* produces a dense curtain of rippling foliage behind the nipah which, with little human interference, is well grown. With *Oncosperma tigillarium* are occasional trees of *Alstonia pneumatophora* (some reaching gigantic proportions), *Sonneratia caseolaris* and other typical mangrove species. *Calamus aquatilis* (2550) was collected here; this typical Malayan mangrove rattan was unknown in Sumatra until I collected it last year near Medan, and so it was of particular interest to find it so abundant at Berbak. Much rarer was the swamp taxon in the *Livistona saribus* complex, *Livistona hasseltii,* with its elegant pendulous glaucous leaflets. *Pandanus aurantiacus* (2551) was also observed in this habitat. Further up river nipah gives way to dense swards of *Pandanus helicopus* (rasau) and behind this is peatswamp forest. *Acriopsis javanica* (2584) and *Vanda hookeriana* (2583) were common epiphytes on *Pandanus helicopus.* Peatswamp forest is usually not particularly rich in palms, but we found the forest in Berbak remarkably rich. It being the height of the dry season the forest was very dry and making exploration possible, whereas during the rainy season many areas would be virtually inaccessible. In the lowest lying areas along creeks and the river-bank dense colonies of the longly stoloniferous *Pinanga patula* (2555) were abundant, together with the broadleafleted *Licuala paludosa* (2554), a robust tall stemmed colonial *Licuala* reminiscent of *Licuala spinosa,* which is present near the coast. A remarkable feature of the *Pinanga* was an almost complete absence of fertile material in the vast number of colonies. An absentee from this habitat was *Cyrtostachys lakka* common in peat swamp forest in S. Sumatra; yet though searched for I did not find it; Ir. Hartono of Institut Pertanian Bogor informed me he found this palm in another part of the Berbak reserve. Common throughout the forest is *Pholidocarpus sp.,* though only very rarely fertile — the stiff dark green leaflets easily distinguish this from *Livistona hasseltii.* Collections of *Pholidocarpus* made in March 1972 in S. Sumatra have shown that the characteristics of the 2 taxa *Pholidocarpus sumatranus* and *P. mucronatus* can occur in one tree, thus suggesting that the two taxa are identical. The difference between the Sumatran *Pholidocarpus sp.* and the Malayan *P. macrocarpus* is also not clear and it may be necessary to combine all 3 taxa. In Berbak many dead trunks of *Pholidocarpus* were encountered; this in combination with the almost complete lack of fertile mature trees seemed to suggest that the populations of *Pholidocarpus* in Berbak have suffered some sort of catastrophe in the past. In lowlying areas *Eleiodoxa* (*Salacca*) *conferta* (2571, 2601) (Kelubi) forms occasional dense prickly colonies; the inflorescence of this palm being terminal and with its fruit structure, the palm is more reminiscent of *Metroxylon* than *Salacca* and Burret's separation of *Salacca conferta* as *Eleiodoxa conferta* is probably justified. An unexpected find was that of *Oncosperma horridum* (2587) called here "nibung padi" as opposed to the more usual name "bayas" unexpected in that the usual habitat of this species is hillslopes and ridgetops; it was also remarkable in that *O. tigillarium* could be seen growing nearby. These two species are normally ecologically separated but not only in Berbak does the ecological separation breakdown. I have seen *O. tigillarium* growing far inland on poor sandy soils and even growing on sandstone cliffs in the Bukit Barisan near Silungkang (West Sumatra). Occasionally we encountered *Nenga* sp. (2556, 2557, 2588, 2593) forming stiltrooted colonies standing above the presumed wetseason water level. I have observed and collected this taxon throughout Sumatra in wetlands but I am still unable to identify it, except that it is close to Javanese *Nenga pumila*. A robust form of *Caryota mitis* was also quite abundant in the area.

In all we discovered eleven species of rattan growing in the swamp forest. The commonest rattan was a very sparsely shortly spiny cymbospathe *Daemonorops* (2558, 2559, 2560, 2572) an extremely variable species, the stem diameter and spininess showing a wide range in form. This rattan is called "rotan batu" and is used for making chairs locally, but is not collected for export. In one collection (2559) most of the fruits were attacked by a pyrenomycete fungus emerging between the scales. One more species of *Daemonorops* was found, *D. geniculata* (2552, 2576), a solitary, short rattan with small rounded knees and diagonal crests of spines on the leaf sheaths. Three species of *Korthalsia* were abundant throughout the area. *Korthalsia flagellaris* (2566) is a robust species, highly characteristic of peat swamp forest in Malaya, Sumatra and Borneo, with narrow fishtailed leaflets, golden brown beneath, with long ansae (leaflet "petioles"); the seedlings of the species with long undivided leaves look remarkably like young plants of *Johannesteijsmannia altifrons* and have sometimes been confused with this latter species: the huge stems of this rattan look very beautiful with the wind and sun playing on the versatile bicoloured leaflets. *Korthalsia robusta* (2567) has large curled ochreas filled with vicious ants; when the rattan is touched the ants rustle in unison in each ochrea, each ochrea slightly out of phase with the next. The third *Korthalsia* species (2564) (near *K. debilis*) is a slender species with a non-inflated ochrea. None of the species of *Korthalsia* was found fertile. Rotan sega, *Calamus caesius* (2579, 2580) was abundant throughout the forest (in fact this most useful of rattans has a range in Jambi stretching from coastal peatswamp through lowland and hill Dipterocarp forests up to the boundary with lower montane forest in the Bukit Barisan. We were unfortunately unable to obtain ripe seed for distribution. Rotan semambu, *Calamus scipionum,* with robust stems collected for furniture-making and exported, was occasional at Berbak.

Scattered through the forest was a remarkable robust *Calamus* (2585), called rotan tunggal locally because of its solitary habit; it is a beautiful rotan with stems climbing high up to the canopy, leaves reminiscent of *Calamus caesius,* sheaths purplish and very densely spiny and with highly swollen knees, and inflorescences reminiscent of *Calamus manan*; the whole plant is covered when young in dense white wax. It appears to be related to *Calamus manan,* but differs in its smaller size, its irregular leaflets, solitary habit, and different armature. Local people use the extremely hard cane in the construction of fish traps out at sea. It approaches *Calamus tumidus* of Malaya. *Calamus javensis* (2553), two forms of *Calamus exilis,* one very slender, the other robust (2573, 2575, 2577, 2578) and *Calamus* sp. (near *C. corrugatus*) (2565, 2574) were collected from the undergrowth — all three species are widespread in Berbak.

In comparison with other peat swamp forests, Berbak has hence, with 22 species a rich palm flora; peat swamp forest in Waikambas, South Sumatra, yielded in February 1971 only 9 species, and at Sengata in East Kalimantan, in June 1971 only four species.

RESIDUAL PALM FLORA IN THE LOWLANDS, JAMBI TO BANGKO

Much of the lowlands of Propinsi Jambi now consists of three types of secondary vegetation — alang-alang fields (*Imperata cylindrica*), low belukar (shrubby growth) and hutan karet (almost completely neglected rubber plantations). Fragments of highly disturbed forest occasionally occur, and between Muara Tebo and Muara Tembesi, there is a patch of still relatively undisturbed forest (see below). Indeed the lowlands of Jambi like much of South Sumatra, present a depressing picture of wasted and destroyed land resources. Despite this, palms especially rattans, are abundant in the secondary vegetation, particularly in the neglected rubber plantations. *Calamus caesius, C. ornatus,* and *Daemonorops palembanica* (2545, 2547) (probably only a variety of *D. melanochaetes*) are the most important rattans in the "hutan karet" and it is possible that the first may receive a rudimentary cultivation in this habitat. Along the river courses, there is a marginally richer vegetation, sometimes with occasional forest trees remaining as relicts. Here *Calamus horrens* (2546), with ecirrate leaves, the leaflets each with a conspicuous thorn on the mid-costa ca 1 cm from the insertion, *Daemonorops crinita* (2549) with ant galleries on the leaf sheath, *Calamus* aff. *bengkulensis,* and *Calamus polystachys,* also with ant galleries, are abundant, along with the ubiquitous *Daemonorops palembanica.* In slightly raised areas with belukar, palm thickets were conspicuous. *Plectocomia* sp. is very abundant in this habitat. I have now collections from many areas of Sumatra and from these collections it appears that there is only one widespread taxon spread throughout the island, but I am uncertain as to its identity. In some respects (armature and colour) it is intermediate between *Plectocomia griffithii* of Malaya, and *P. elongata* of Java, but the inflorescence structure is closer to the latter species. In size it is extraordinarily variable from great giants in the lowlands and on rich soil in the mountains, to slender plants only 2.5 m tall on extremely poor podsolized soils on mountain ridgetops. It corresponds to *P. sumatrana* of Miquel, thought by Beccari to be conspesific with *P. elongata. Daemonorops periacantha, Korthalsia echinometra, K. robusta,* and *Calamus manan* were observed in the less drastically disturbed areas. Three species of *Salacca* were also conspicuous — *Salacca affinis* (usually in valley bottoms), *Salacca edulis* with irregular fanned leaflets, and the robust *Salacca edulis* var. *sumatrana* with regular stiff leaflets all held in one plane. In the remnants of swamp forest, *Pholidocarpus* sp., *Eleiodoxa conferta, Oncosperma tigillarium, Caryota mitis,* and *Korthalsia flagellaris* survive as depauperate, often burnt, individuals. Otherwise the only palms visible as one drives through the lowlands are coconuts, oil palms, *Arenga pinnata, Areca catechu, Metroxylon sagu,* and occasional trees of *Actinorrhytis calapparia* and *Phoenix dactylifera* planted in kampungs. Near Sarolangun, one isolated tree of *Orania sylvicola* surviving in the midst of alang-alang was observed near the roadside.

PEGUNUNGAN MERANGIN, BANGKO TO SUNGAI PENUH

The road from Bangko to Sungai Penuh, from Perentek westwards passes through forest, largely Hill Dipterocarp Forest. The relief is high, the valleys being very steep-sided, the rivers often running through deep gorges, the most spectacular one being that of the Batang Merangin which flows from Danau Kerinci and which is followed by the road. The forest along the road stretches from about 200 — 600 m altitude and consists largely of Hill Dipterocarp Forest. Three dicotyledonous trees, *Terminalia copelandii, Octomeles sumatrana,* and *Bombax valetonii* are extraordinarily abundant and with their towering, oddshaped crowns, lend a peculiar aspect to the forest in the valley bottoms and lower hillslopes. The upper slopes are covered by the cabbagey crowns of Dipterocarpaceae. In the undergrowth along streamsides leaves of *Amorphophallus titanum* often 5 or more metres tall were often encountered and once we found the massive fruiting head covered in scarlet fruit 4 cms long. The palm flora is magnificently rich. The most conspicuous palms seen all along the steep riversides and hillslopes were "bayas" *Oncosperma horridum, Arenga obtusifolia* and "rotan manau" *Calamus manan*. The last is extraordinarily abundant, emerging from the canopy, the huge leaves carrying rows of pendulous glaucous leaflets trembling in the slightest breeze; seedlings with their characteristic bifid leaves with glaucous cucullate lobes tipped with black bristles were to be found everywhere in the undergrowth. Along the valley bottoms another tree palm, *Caryota rumphiana* was conspicuous but not common; this giant solitary *Caryota* was absent from the upperslopes; normally this is a very characteristic palm of Lower Montane Forest, and throughout the Bukit Barisan is found in this habitat, often long persisting after the forest has been removed; its presence at such a low altitude (i.e. ca 400 m) is hence rather surprising — it may be that the climate of deep narrow valleys is more akin to that of Lower Montane Forest, but *Caryota rumphiana* is the only normally montane palm encountered in this locality. The small areas of flat ground near the Batang Merangin and its side streams, and the lower hillslopes carry the richest palm flora. Here there is a wealth of small undergrowth palms, the commonest and most conspicuous being a remarkable new species of *Arenga* (2606, 2638). This is a low slender stemmed colonial species of Section *Didymosperma* but from inflorescence structure, it is closer to *Arenga retroflorescens* of Sabah, Borneo, in Section *Arenga*. Unlike the Bornean species, the new *Arenga* has broad almost diamond-shaped leaflets, the whole leaf resembling that of *Wallichia densiflora*. The stems are to 2,5 m tall and 3 — 4 cms in diameter, bare below, covered in leaf sheaths and black fibres above. The inflorescences are acropetal in development and pierce their way out horizontally between the leaf sheaths. They are spicate and almost always solitary unlike many *Arenga spp.* which have multiple inflorescences from one node — they are very short being only about 6 cms long, and densely covered with male flowers. I searched many colonies for female flowers or fruit, but in vain — there were many old inflorescences with remains of male flowers but never any vestige of a female flower. The colonies appeared to be entirely male. This is a plant of great interest and it is most unfortunate that no seedlings were available for transplanting to Bogor. In some places colonies of this palm on stream sides produced elegant curtains of foliage. In one place I collected material from a colony of *Arenga porphyrocarpa* (2639). The curious "stemless" *Pinanga latisecta* (2619, 2622) was common along streamsides, with its hand-like red inflorescences hidden among the fibrous indehiscent leaf sheaths. Like the populations in Kepahiang, Bengkulu and most of the plants observed near Muara Dua, Prop. Palembang, the flowers are distichous in the Merangin specimens, unlike in the type plant. I later found spiral-flowered populations in the Bukit Barisan, west of Sungai Penuh (see below). Other *Pinanga* species in this habitat included *P. disticha* (2632) and two other taxa near *P. limosa* (2617), one with beautiful undivided dark-green leaves, the other with paler sigmoid leaflets. *Iguanura* aff. *leucocarpa* (2623), an exquisite clustering undergrowth palmlet, was found very sparingly in one river valley growing near the river; its leaves have cuneate erose-margined leaflets and the inflorescence is very shortly pedunculate and has 5 — 7 long, pendulous, rufous-haired rhachillae: the immature fruit is white. A short *Licuala* (2616) resembling *L. pumila* was also collected in this habitat. Rattans in the valley bottom included *Daemonorops didymophylla* (2640), *Daemonorops* aff. *crinita* (2647), *Calamus javensis, C. rhomboideus* (2608) (this collected in mature fruit), *Calamus diepenhorstii* (2618), and *Korthalsia robusta,* and *K. hispida* (near *K. robusta* but differing in being smaller, having a slender inflorescence, and the ochreas being covered in easily detachable hispidity).

Further up the hillslopes the undergrowth *Licuala* spp. *Pinanga* spp. and other Arecoids tend to fade out and the palm flora consists almost entirely of rattans, until the ridgetop is reached, where undergrowth palms reappear. Rattans on the hillslopes included the two terminal flowering rattans, *Plectocomiopsis geminiflorus* (2641, 2654) and *Myrialepis scortechinii* (2604), *Calamus manan, C. ornatus, C. javensis, C.* aff. *corrugatus* (2610), *C. ulur* (2607), *C. exilis* (2629), *C. caesius, C. retrophyllus* (2615), and *C. flabellatus* (2627) (which, from an examination of many plants, appears to be only a juvenile form of *C.* aff. *corrugatus*). *Daemonorops* sp. (2657) (section Cymbospatha), *D.* aff. *geniculata* (2626) with regular leaflets, *Korthalsia scaphigera, K.* aff. *junghuhnii, K. robusta, K. echinometra* (2614) and *Ceratolobus laevigatus* var. *divaricatus* (2628). The last species I have also collected in male flower near Kepahiang, Bengkulu: the Bengkulu specimen has a 20 cm long spiny spathe, whereas the Merangin male inflorescence looks very different with a 5 cm unarmed spathe. Vegetatively the two plants are virtually identical with the divaricate opposite leaflets, and slender stem bearing sparsely spiny sheaths.

On ridgetops, soils sometimes showed signs of mor humus development and the palm flora differed slightly on these soils from that on the hill slopes. *Pinanga disticha,* normally a valley bottom palm was found occasionally with an entire leaved *Pinanga* in the *P. limosa* group (2649). A remarkable *Pinanga* in the group of *P. malaiana* (2650, 2659) was also found here; this is a very robust taxon with dark leathery-textured narrow pinnae, and a purplish, blackish-green crown-shaft. The fruit are similar in their velvety appearance and arrangement to typical *P. malaiana* but is turbinate in shape. Two *Licuala* spp. were occasional on ridgetops; one (2612, 2613), a solitary species, has very narrow deeply dentate compound leaflets with the terminal leaflet broad and split below to give windows, the inflorescence consisting of 3 erect spicate partial inflorescences; the other is *Licuala ferruginea,* normally found in lowland swamps — it has very short stems, robust leaves and highly branched rusty furfuraceous partial inflorescences with pink young fruit. Like *Licuala ferruginea, Salacca affinis* (2609, 2648), is normally associated with moist streamsides and was here found on ridgetops. Rattans on ridgetops included *Daemonorops depressiuscula* (2660), *Daemonorops* sp. section *Rubra* (2655), *Plectocomia* sp. and *Calamus* aff. *adspersus.*

MONTANE FOREST ON G. TUJUH AND LOWERSLOPES OF G. KERINCI

I found the palm flora of the montane forest at G. Tujuh disappointingly poor and that on G. Kerinci seemed even poorer. This may in part be due to the terrific disturbance of the forest, but may also reflect a genuine paucity. Despite the disturbance of ladangs, *Caryota rumphiana* is everywhere common, fine old specimens commonly longly persisting in the midst of plantations of tobacco and kaju manis (*Cinnamomum*). Within the forest, four species of rattan are abundant. *Daemonorops singalana* (2675, 2687), a species in section Cymbospatha with pendulous inflorescences, *D.* aff. *propinqua* (2676), a slender rattan with interrupted leaflets and fruit with dragon's blood resin on the scales, *Calamus* sp. (2680, 1685, 2697) rotan kuning reminiscent of Javanese *Calamus heteroideus* and *Calamus* sp. (2709), with deep purplish-tinged inflorescences, and, with its inflorescence and flower structure, and hairy ecirrate leaves, obviously a relative of *C. ciliaris* and *C. exilis.* On hillslopes between 1,400 m and 1,800 m, I found a small *Salacca* sp. (2682); by its leaf form and male inflorescence it appears to be a member of the complex of *Salacca edulis* yet is only 1.5 m tall and has minute inflorescences. It is similar to another diminutive *Salacca* I collected on G. Kemiri in Aceh.

Two *Pinanga* spp. were common throughout the forest; one (2679, 2689) a longly stoloniferous *Pinanga*, reminiscent of *P. patula*, occured mainly between 1,400 m and 1,900 m, fading out above this height; the other (2683, 2693) is closely related to *Pinanga coronata* but differs from the montane variant of *P. kuhlii* with narrow leaflets which is normally referred to as *P. coronata* in Java.

The large swamp of Danau Bento seemed to be devoid of palms except at the edges.

BUKIT BARISAN, WEST OF SUNGAI PENUH

The Bukit Barisan between Sungai Penuh consists of fine Hill Dipterocarp Forest with small areas of Lower Montane Forest from about 1,300 m upwards. The area is remarkable for the beautiful stands of native *Pinus merkusii* and *Agathis alba*, both species growing in almost pure stands or mixed with each other on steep ridges with poor podsolized soil. The scenery with the *Pinus*, steep slopes, often with rockfaces, steep valleys with thundering clear rivers, is extremely beautiful. To the palm botanist the forest is remarkable for the abundance of species of *Pinanga* and *Daemonorops*. *Pinanga latisecta* (2754) was abundant but unlike the populations on the east of the Bt. Barisan, the inflorescences of this population bear spiral flowers and the male flowers persist as blackened remains. Despite this difference which cuts across a subgeneric boundary in *Pinanga*, I feel sure that both populations represent one variable species; populations in S. Sumatra near Muara Dua consisted of both spiral and distichous flowered plants. Another fine *Pinanga* collected is *P.* aff. *densiflora* (2751); in the young state, the leaves are exquisitely mottled with pale green, dark green and chocolate, and flushed pink, with the petiole dark pink, making it a superb plant for horticultural purposes. On steep slopes grew a *Pinanga* (2753) close to *P. malaiana* but differing from the typical form in having long stolons, and almost erect, slightly arcuate leaves with drooping leaflets. Besides these *Pinanga* spp. I recognized five other taxa, all of which were alarmingly variable; 2735 and 2738 represent the broad and narrow leafleted variants respectively of a species like a half-sized *Pinanga kuhlii;* entire leaved and pinnate forms of a limosoid *Pinanga* with branched inflorescences (2739, 2740, 2742, 2745); another *Pinanga*, with trapezoid leaflets and with a simple unbranched inflorescence (2744); an exquisite slender, tall *Pinanga* with slender rhomboid leaflets and many branches in the inflorescence, bearing silky fruit (2722), and more specimens (2746) of the species resembling *P. coronata*, found on G. Tujuh. Two other Arecoid undergrowth palms were encountered — *Nenga* sp. (2750), similar to the *Nenga* sp. collected at Berbak, and *Areca* sp. (2752). The latter is a beautiful solitary palm, about 3 m tall with arcuate leaves with sigmoid leaflets, and turbinate brick red fruit — it is very similar to the Malayan *Areca montana* of Ridley.

Common in wet hollows near the valley bottom was *Arenga* sp. called "baling" locally. This is an undescribed species which I have collected near Bengkulu, and near Muara Dua, and there is also a collection by Jacobs from G. Tanggamoes. It is a spectacular palm with very short stems and huge 5 — 6 m leaves with broad regular leaflets. In the Bukit Barisan I was unable to find fertile material. In the higher areas *Caryota rumphiana* was occasional but not nearly so common as it was in the valley of the Batang Merangin, and below 1,200 m *Oncosperma horridum*, and *Arenga obtusifolia* and occasional plants of *Arenga pinnata* were seen in the midst of the forest. This last species is not rarely encountered in the midst of primary vegetation in the Bukit Barisan and one wonders if is native here or whether dispersed by animals from local kampungs.

Streamsides carried dense thickets of *Salacca edulis* var. *sumatrana*, and a *Daemonorops* sp. in section *Rubra* (2734) sprawled, impeding progress. But it was the hillslopes and ridgetops which carried an almost overwhelming variety of rattans. The common widespread rattans *Calamus ornatus, C. manan, C. javensis, C. caesius* and *Plectocomia* sp. were present. Besides these *Korthalsia echinometra, K.* aff. *junghuhnii* (2723) and *Korthalsia* sp. (near *K. rigida*), *Calamus conirostris* (2755), *Calamus* sp. near *C. conirostris* but apparently different (2737), *C.* aff. *spectabilis, Daemonorops singalana, D. propingua* (2719, 2723) and *D. hystrix* (2732, 2717) were all abundant. *Calamus* sp. (2720, 2721, 2724) on the upper hillslopes formed the dominant palm in the undergrowth — it is a "stemless" species with ecirrate leaves and chestnut coloured fruit and is close to Malayan *Calamus perakensis.* The most remarkable rattan, however, was a species of *Daemonorops* (2728, 2729, 2730, 2731) with a massive solitary erect trunk to 1.5 m tall and 8 — 10 cm in diameter and a crown of more or less ecirrate leaves and pendulous inflorescences, the spathes densely covered with short compound spines. In habit it is reminiscent of *Calamus arborescens* except that it is solitary. Inflorescence armature appeared to be very variable, and I consequently collected a range to show the variation. Unfortunately no ripe fruit of this extraordinary rattan was available for planting in the Kebun Raya. One more rattan was found (2727) a species related to *D. kunstleri* but with very broad leaflets. Many of the rattans from this area have not yet been identified and it is likely that some of them represent new taxa. In *Daemonorops*, Sumatra is particularly rich and many appear to be undescribed.

FOREST FRAGMENTS NEAR BUKITTINGGI

In the Batang Palupuh *Rafflesia arnoldii* Nature Reserve a few palms of interest were noted. *Arenga* sp. "baling" (2756) was collected fertile and a remarkable *Daemonorops* sp. (2757) in section *Rubra,* with elongate fruit was collected with ripe fruit. Other palms included *Pinanga kuhlii* var. *sumatrana, Pinanga* aff. *densiflora* and *Arenga obtusifolia.*

LOWLAND FOREST FRAGMENT BETWEEN MUARA TEBO AND MUARA TEMBESI

Although only a very short time was available for collecting palms in this area, some interesting species were noted. Two species of *Licuala* were common: *Licuala* sp. (2761) with large leaves on 2 m petiole appears to be close to *L. ferruginea* but the inflorescence is sparsely branched and much slenderer than in that species; the leaves are used by aboriginees, "orang kubu", for thatching; 2762 is close to *Licuala pumila* but with an unusually large number of leaflets (25 leaflets). Typical *Pinanga malaiana* was collected (2759) as a comparison with the variants collected in the Pegunungan Merangin and the Bukit Barisan, and a *Nenga* (2763) was found in young fruit. Rattans included *Calamus ornatus, C. manan, C. conirostris* (2760), *Calamus diepenhorstii* (2758) with very long, pendulous inflorescences and ecirrate leaves, *C. oxleyanus* and C. *javensis, Myrialepis scortechinii* and *Plectocomiopsis* sp.(2764). This last fits the description of *P. corneri* from Kemaman, Trengganu, in the Malay Peninsula. The leaf sheath prolonged into an ochrea and the fruits, suggest this little known species. The area would well reward more thorough study.

CONCLUSIONS

In all about 450 numbers were collected, of which about 200 were of Palms and 80 were of Pteridophytes, 70 numbers of plants were introduced into the Botanic Gardens, and the remainder were of other families. This represents a great increase in the number of palms from this area of Sumatra represented in herbaria and hence a considerable increase in our knowledge of the palm flora of Sumatra. In all about 115 taxa of Palmae were collected or observed and of these some appear to be new taxa. The area however is by no means exhausted and it would certainly be well worthwhile to make further expeditions, in particular to the Pegunungan Merangin, the Bukit Barisan south of Sungai Penuh, and a range of well forested hills northeast of Sijunjung, West Sumatra, observed on the way back to Jambi.

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